United States
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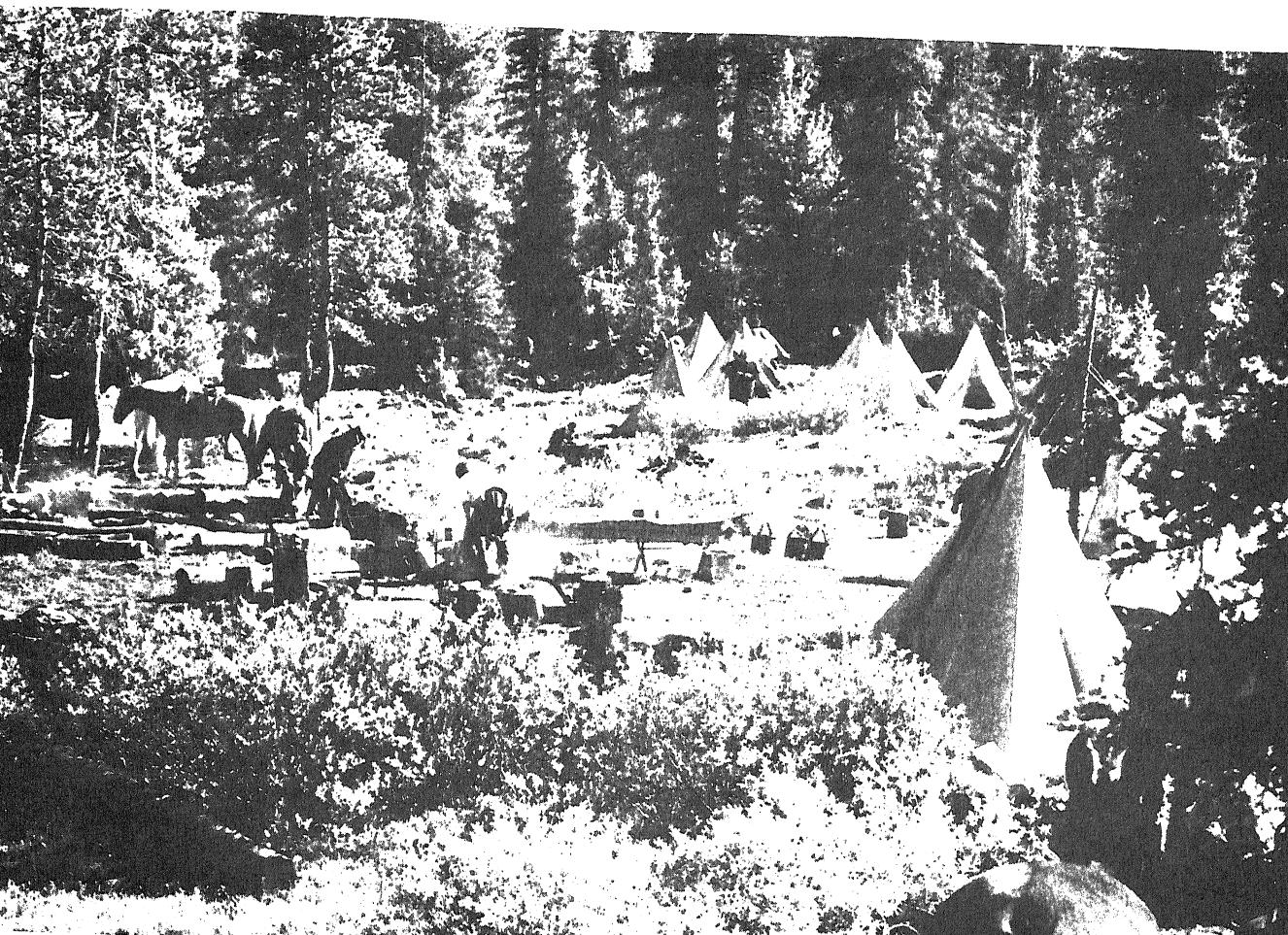
**Intermountain
Forest and Range
Experiment Station
Ogden, UT 84401**

Research Paper
INT-302

February 1983

Monitoring the Condition of Wilderness Campsites

David N. Cole



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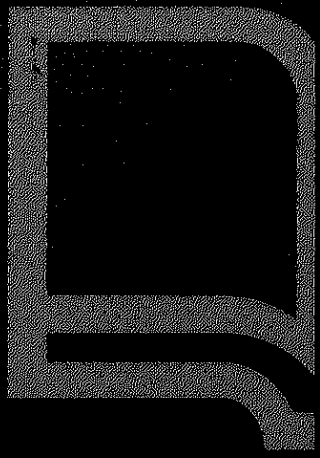

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THE AUTHOR

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RESEARCH SUMMARY

Information on the distribution and severity of wilderness campsite impacts is necessary for planning purposes. Monitoring of campsite conditions will also allow managers to evaluate change in campsite condition and how such changes relate to management actions. Existing campsite monitoring systems are based on visual estimates of impact, measurements of impact, or photographs. The most useful systems (1) evaluate a number of meaningful parameters, (2) record each of these parameters separately, and (3) use as precise techniques as management can afford and still be able to inventory all sites. Estimation techniques will probably have to be used in most wilderness areas where funds are short and campsites are numerous. Suggestions for how to develop such a system are provided. Keys to success include adequate training so techniques are used in a consistent manner, quantitative category definitions, and documenting site locations so they can be reassessed in the future.

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INTRODUCTION

Recreational use of wilderness and backcountry areas inevitably leaves an imprint on natural environments intended for preservation. Wilderness use affects trails, meadows, and lakeshores, but impacts are usually most pronounced on campsites. Where wilderness managers have judged that impacts exceeded acceptable levels, they have often taken such actions as closing severely deteriorated sites, diverting campers to less-used areas, or confining use to designated sites. Too often these actions are taken without the benefit of comprehensive campsite condition data. Consequently, it has been impossible to evaluate the effects of these actions on either impacted sites or adjacent areas which are currently undamaged.

In recent years, managers have been under pressure to improve the sophistication and accountability of wilderness management. Regulations in the National Forest Management Act of 1978 specifically require Forest Service wilderness managers to limit and distribute visitor use in such a way that natural conditions are largely unimpaired and to monitor the response of the wilderness resource to these actions. Much of this effort must be focused on campsites, the places that are most severely altered by recreational use and among which visitor use may have to be limited and distributed.

Unfortunately, funding for the collection of data needed for wilderness management is sorely lacking compared to funding available for collecting data used in the management of other resources, such as timber. Access to most wilderness acreage is poor; motor vehicles are not allowed and many remote areas are not even penetrated by trails. Moreover, many areas have thousands of sites that must be inventoried.

This paper discusses desirable characteristics of a backcountry campsite inventory and monitoring system, evaluates existing methods, and provides suggestions for developing a system that builds on the strong points of existing techniques.

DESIRABLE CHARACTERISTICS

A campsite monitoring system should provide accurate meaningful information about changes that have already curred on campsites. This tells the manager how widespre and severe recreational impacts have been and, therefore, much of a problem exists. It should also provide a baselin subsequent monitoring of conditions so that trends can b evaluated.

A good system will have four characteristics: (1) meanir measures of impact are utilized; (2) measurement techniq reliable and sensitive; (3) costs are not too high to prohibi inventory of all sites; and (4) measurement units can be pr cisely relocated.

The value of the information collected will depend on h carefully variables are selected. Some variables provide a measure of current campsite condition, but no measure o much change has occurred. For example, the vegetation c of a campsite is not a measure of impact. It is so highly variable under natural conditions that it must be compare an estimate of the original cover on the site before it provi meaningful measure of change.

Variables selected for use also need to be applicable to s that have received radically different types or amounts of and sites in different environmental settings. Similar ratin even in very different situations, should reflect similar am of change. This can be achieved most effectively by collec information on a number of different parameters.

Although it may sometimes be desirable to aggregate th parameters in a single measure of site condition, importar formation will be lost if the data cannot be disaggregated well. The ability to evaluate change in individual paramet such as size of the campsite, is particularly valuable to a monitoring program. Disaggregation also allows manager flexibility of changing their minds about the relative impo

The second characteristic is reliability; assessment techniques must be sufficiently precise to allow independent observers to reach similar conclusions about site condition. This depends on precise explanation of techniques and consistent training of evaluators. Assessment techniques must also be sensitive enough to detect managerially relevant differences between sites and changes over time.

Managers must always make a tradeoff between reliability/sensitivity and cost. More precise techniques take more time and this may become prohibitive if sites are numerous. Assuming the primary objective is to characterize the distribution of impacted sites and be able to detect major changes, managers would do best to use as precise techniques as they can afford and still be able to inventory all sites. It might also be desirable, however, to take more precise measurements on a subsample of campsites. This practice would allow managers to detect more subtle changes and to more accurately relate such changes to use levels, environmental conditions, or other variables that might affect amount of impact. For example, such measurements have been taken in Sequoia and Kings Canyon National Parks and in Great Smoky Mountains National Park (Bratton and others 1978).

Finally, in order to monitor changes over time, it is important to document the exact location of the areal unit on which the original measurements were taken. This might be the entire campsite, square plots, line transects, or any other sampling unit.

EVALUATION OF EXISTING SYSTEMS

Perhaps the most widely used campsite inventory system is the Code-A-Site system originally proposed by Hendee and others (1976). Important information about each site is recorded on edgepunch cards, which facilitate data retrieval and manipulation. It is the method of collecting and storing information rather than the type of information collected that is unique to this system. In fact, much of the information on the Code-A-Site form is irrelevant in backcountry. Several managers have modified the cards, however, to more adequately achieve their data needs. In Olympic National Park, the edgepunch cards have been completely reprinted with different types of information (Schreiner and Moorhead 1979). Managers of the Selway-Bitterroot Wilderness merely developed an overlay, with more relevant information to use with the original cards developed by Hendee's group. Campsite condition data—my specific concern in this paper—can be stored on Code-A-Site forms or in any other convenient manner.

Most existing campsite monitoring systems fall into one of three basic types. In one type, campsites are given a single condition rating which is usually based on visual estimates of impact. In other systems, a number of measurements are taken, each of which can be repeated and used as a separate measure of change. Photographic techniques are the basis of other

This problem can be alleviated by defining different levels impact. Frissell (1978) developed a method of rating campsit condition that recognizes the following condition classes: (1) "Ground vegetation flattened but not permanently injur Minimal physical change except for possibly a simple rock fireplace"; (2) "Ground vegetation worn away around firepl or center of activity"; (3) "Ground vegetation lost on most c the site, but humus and litter still present in all but a few areas"; (4) "Bare mineral soil widespread. Tree roots expose on the surface"; and (5) "Soil erosion obvious. Trees reduce in vigor or dead" (fig. 1a and b). One of the Code-A-Site mo ifications made by managers of the Selway-Bitterroot Wilder ness was to define extreme, heavy, moderate, and light levels impact on the basis of these same easily recognized indicators of change.

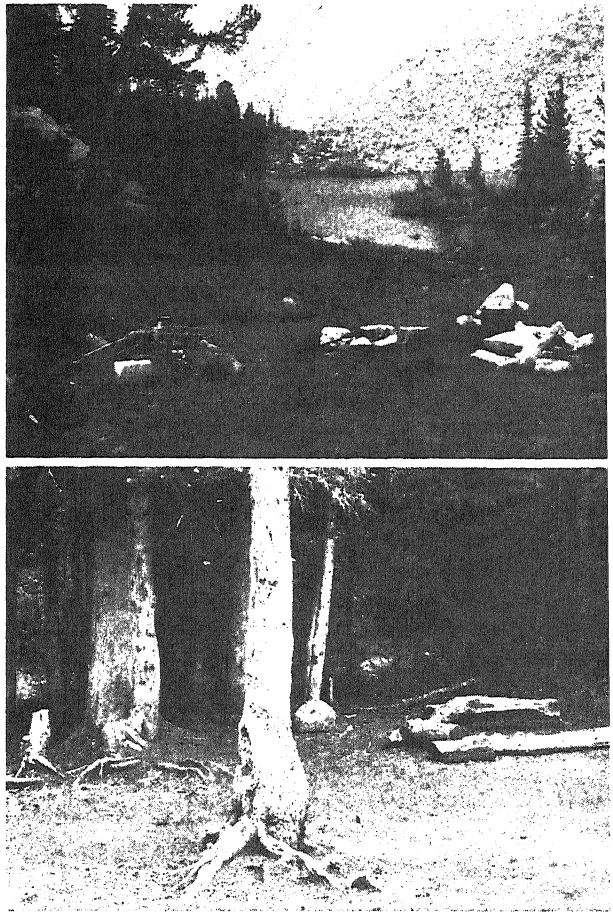


Figure 1.—Examples of campsites with condition class ratings of (A)2 and (B) 4 (Frissell 1978).

Either of these "condition class" systems provides the manager with a rapid, inexpensive technique for rating camp-

In many other environments, however, such as alpine fell-fields or grasslands, the system does not work well. Where there are no trees, ratings must be based on only one or two parameters. Moreover, the significance of the changes associated with a condition such as "ground vegetation lost on most of the site" is not equivalent in such diverse vegetation types as the sparse undergrowth of coniferous forests and alpine turf communities, where recovery of damaged vegetation may take centuries (Willard and Marr 1971).

This problem was substantially alleviated in a system developed for use in Sequoia and Kings Canyon National Parks (Parsons and MacLeod 1980). This system is also based on rapid estimates of easily recognized indicators of change, but eight separate parameters are used: vegetation density, vegetation composition, campsite area, area of the barren core, campsite development, presence of organic litter and duff, number of access (social) trails, and number of tree mutilations. The mean value for all the ratings that apply to the site—number of tree mutilations, for example, is not applied to nonforested sites—becomes the campsite rating. Even if a couple of parameters cannot be applied to the site, the rating should still be valid because it is based on a large number of other parameters.

The major problem with this system is that after evaluators become experienced, only the site's overall condition rating is recorded; individual parameters are only noted on a subsample of sites. Consequently, disaggregation of the data is impossible. It will not be possible to evaluate future changes in individual parameters, such as campsite area or degree of development. Perhaps more importantly, wilderness managers are locked into the current system of weighting each of the eight parameters equally. If each parameter had been recorded separately, managers at a later date could delete parameters they considered unimportant or change the weighting system without reevaluating each site.

The reason data were aggregated in Sequoia and Kings Canyon National Parks was that there were too many campsites to take the time or storage space to fill out a separate form for each site. Over 7,400 campsites have been inventoried in the two Parks (Parsons and MacLeod 1980). This large number of campsites is uncommon. In the more common situation of fewer campsites, it would be worth the additional cost to record each parameter separately, with a separate form for each site.

Measurements

Several areas use measurements rather than visual estimates. Such systems are more costly—it takes more time to rate each site—but precision is higher (fig. 2). The information contained in such ratings, however, is not necessarily more meaningful. Olympic National Park, for example, rates sites on the basis of bare ground radius, the mean distance to "the first live plant" along eight transects radiating from the campsite center (Schreiner and Moorhead 1979). In the Eagle Cap Wilderness, bare ground radius proved to be a less useful predictor of campsite condition than Frissell's less precise, but more meaningful condition class (Cole 1982).

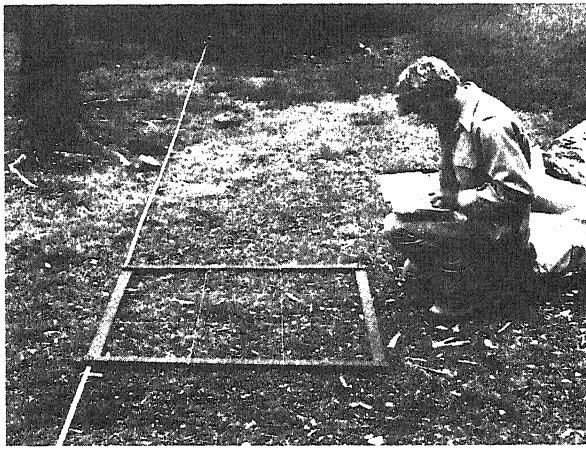


Figure 2.—Worker uses a meter-square quadrat to measure vegetation cover on a wilderness campsite.

This problem can be alleviated by measuring more param eters. In the Olympic National Park system, the number of social trails entering each site and the number of areas tram by horses are also noted. The managers of Great Smoky Mo tains National Park measure the area, on and around each s of the following "disturbances": bare rock, mud, slope ero sion, bare soil, leaf litter, trampled vegetation, firewood cle ing, tree damage, and trash dispersal (Bratton and others 19 In the Selway-Bitterroot Wilderness, tree mutilations are recorded, as is the amount of bare mineral soil, litter-covere soil, and vegetation along each of eight permanent line transects.

Provided that meaningful parameters are measured and a propriate sampling methods are used, measurements are pre able to estimates. They reduce the potential for observer bia and increase sensitivity to the point where even minor differ ences and changes in condition can be detected. The cost of such a system is high, however, and where there are a large number of campsites, the increased precision may not be wo the expense. Where the number of campsites is low—Great Smoky Mountains National Park, for example, had only 113 legal sites and another 289 illegal sites—measurements mi be a worthwhile investment.

It is important that meaningful and comparable evaluatio of campsite condition be taken on all existing campsites. Th makes it possible to detect the development of new campsit and to evaluate changes in the condition of more lightly im- pacted sites. The ability to evaluate change on these more ligh impacted sites is of crucial importance because both the unc tainty of what is happening to these sites and the potential f change are so much greater here than on more heavily im- pacted sites. If funding is insufficient to take measurements all sites, it would be better to use an estimate system on all s than to only take measurements on some of the sites.

otographs

number of areas have made replicable photopoints the s of their monitoring system. In a system used in the way-Bitterroot Wilderness, 360°-panorama photo mosaics 3) are taken from permanent points located near the center ach site (Walker 1968). Photographs have generally not ven to be reliable substitutes for field measurements or mates of parameters, such as ground cover vegetation or exposed mineral soil. Patches of sunlight and shade often make interpretation of the ground cover difficult, and it is seldom possible to distinguish features beyond the closest trees. As supplementary documentation they can be quite useful, however. They can help identify the site for future reassessments, record campsite features not measured in the field, and provide a visual supplement to the data collected in the field.

re 3.—Panorama photo mosaics have been used in the Selway-Bitterroot Wilderness.

COMMENDATIONS

om the preceding discussion, the most useful campsite inory and monitoring system appears to be one that (1) evals a number of meaningful parameters, (2) records each of e parameters separately, and (3) uses as precise techniques anagement can afford and still be able to inventory all

oosing the Precision Level

his choice must be made primarily on the basis of available ing and the number of campsites. The frequency of periodic sessments of the sites should also be considered.
here the number of campsites is low and/or funding is , precise measurement techniques utilizing such sampling s as permanent quadrats, belt transects, or line transects be afforded and are preferred. Measurements taken on a ample of sites might also provide a useful supplement to an nation system in areas which cannot afford to take measents on all sites.
most areas a measurement system, which usually involves ding an hour or more on each site, is too time-consuming costly. In this case, visual estimates can be used in place of surements. Precision and sensitivity are reduced but the reng ratings should be adequate to meet most management s, if each parameter is independently recorded. Using such tem, the amount of time spent on each site could be less 10 minutes.
nally, if there are so many campsites in an area that even inutes per site is too much, campsites can be given a single egate rating. As mentioned above, this severely limits flexiy in the future use of the data. In the system in use at uoia and Kings Canyon National Parks, a couple of utes per site is all that is necessary.

Choosing Parameters

Managers should choose parameters that reflect unique types of impact occurring in the area they administer. Types of impact that are most likely to conflict with management objectives should be given high priority. In general, the types of impact that occur on campsites do not differ greatly from place to place. Many of the same parameters are used by Parsons and MacLeod (1980) in California, by Frissell (1978) in Minnesota and Montana, and by Schreiner and Moorhead (1979) in Washington. Most other areas will probably also find these same parameters to be a useful list of possibilities.

Based on work in a number of wilderness areas, but particularly in the Eagle Cap Wilderness in Oregon, I have developed a campsite monitoring system that incorporates many of these same parameters. The system uses visual estimates on the assumption that this type will be most useful in most areas. The following discussion describes suggested estimation techniques for each parameter. While these estimation techniques should be widely applicable, class definitions, which are also included, should vary greatly from place to place.

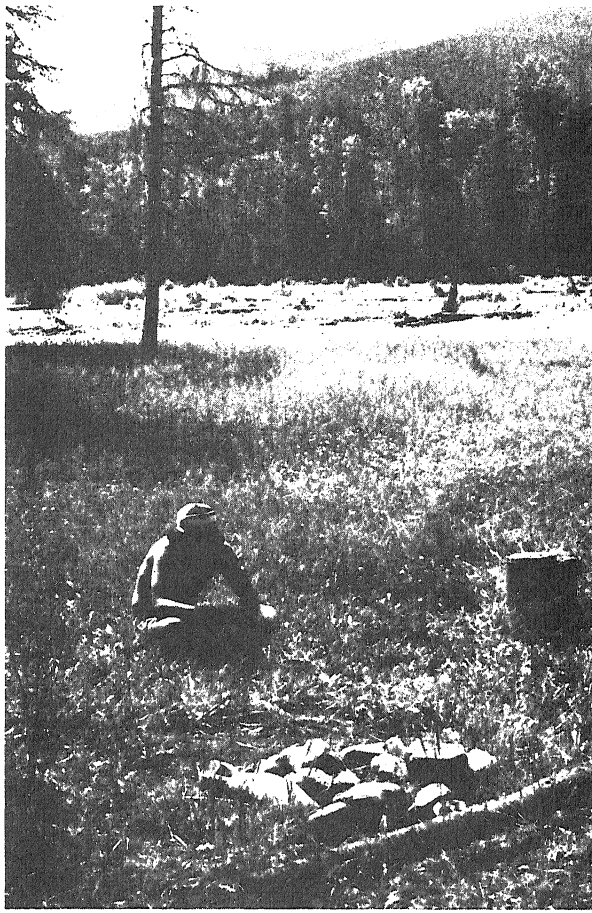
For example, I recently used this system in the Bob Marshall Wilderness in Montana, an area that receives heavy horse and outfitter use and which, in many locations, has few potential campsites. As a result of this type of use, most sites, when compared to those in the Eagle Cap Wilderness, are large, littered with horse manure, and have experienced severe tree damage and root exposure. Consequently, almost all sites received the worst ratings for camp area, cleanliness, damage to trees, and exposure of tree roots. Despite identical ratings, some of these sites were much worse than others. In order to provide ratings that identify the most severely impacted sites, I developed class definitions that were less stringent than those used in the Eagle Cap Wilderness. In like manner, managers of most areas should adapt the class definitions suggested in this

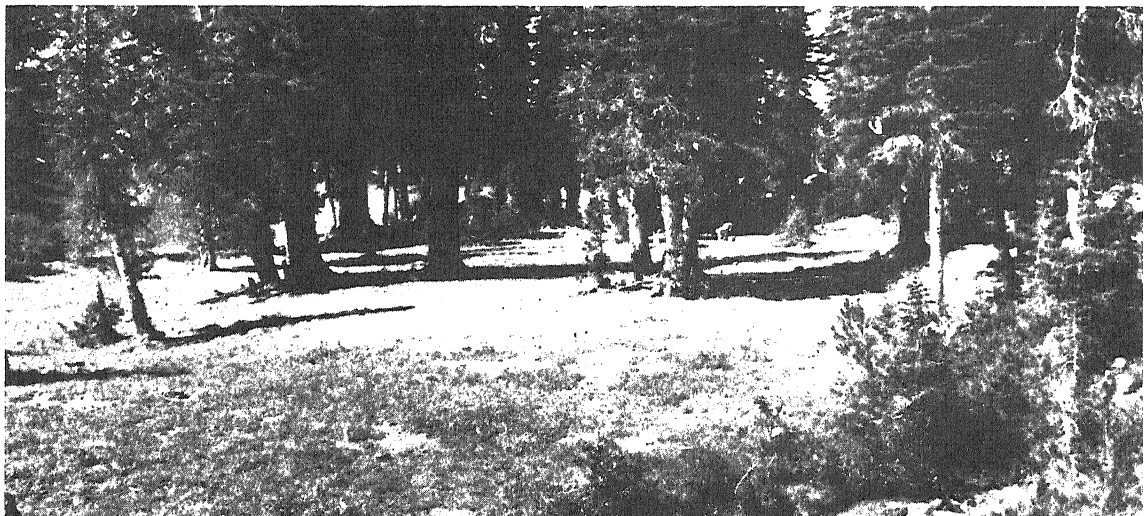
CONDITION OF GROUND COVER VEGETATION

Loss of ground cover is one of the most pronounced changes that occurs on campsites. It is a prominent, early indicator of campsite condition in most systems that have been devised. Estimates of percent cover are not useful in themselves because there is so much variability in the cover of undisturbed sites. Some system of relating campsite vegetation to that of the surroundings is needed.

My recommendation is to estimate the percent cover of campsite vegetation in one of the following coverage classes: 0 to 5 percent, 6 to 25 percent, 26 to 50 percent, 51 to 75 percent, and 76 to 100 percent. With time and training this can be done consistently. It may be helpful to walk around the site and mentally average cover in different parts of the site. In cases where it is extremely difficult to choose between classes, make your best guess and then note the classes it was difficult to choose between. Make a similar estimate of the percent cover of the vegetation surrounding the site, keeping in mind that you are attempting to estimate what the cover of the site was before it was used as a campsite. This involves looking closely at places that are similar to the campsite in terms of rockiness, slope, canopy cover, and species composition, and looking at the vegetation in places protected from trampling. While this estimate is seldom simple to make, it can be done with practice.

Comparison of these two coverage class estimates can be used to give each site a rating from 1 (least impact) to 3 (most impact). A campsite with a vegetation cover that is two or more coverage classes less dense than that found offsite is assigned a rating of 3. For example, if the vegetation cover is 51 to 75 percent offsite and 6 to 25 percent onsite (two coverage classes less dense), the campsite will receive a rating of 3. Vegetation loss equivalent to one class is assigned a 2, and no loss is assigned a 1 (fig. 4).





measure of change in species composition would also be ul. This requires considerable judgment and training, how- and is particularly difficult to assess on campsites where ıtially all vegetation has been lost. The Sequoia and Kings yon National Parks system utilizes this parameter, consid- it to be inapplicable if the site has been totally devege- l. This can lead to worse ratings for a site with some highly nilar vegetation left than would be given to a completely ıded site. It might be better to merely note whether or not egetation left consists primarily of weedy invaders.

POSURE OF BARE MINERAL SOIL

ecent studies have shown that the amount of mineral soil sed on a site increases dramatically on more heavily used (Fichtler 1980; Cole 1982). Therefore, soil exposure is a cularly good indicator of campsite condition. As with the eding parameter, it is possible to estimate coverage in the coverage classes, both on the campsite and in a neighbor- rea. The vegetation and bare soil estimates can be made ltaneously. The same rating system can be used as well. re mineral soil is more difficult to estimate than vegetation use there is usually a continuous gradation from twigs, s, and needles, through partially decomposed and decom- d litter to mineral soil. Moreover, on many campsites y trampling has arranged these materials in a highly in- te mosaic of litter and exposed soil. Where litter layers are and have obviously been displaced by recreational use, my ıates of bare soil have been high. Elsewhere I have been conservative. Training and calibration of observers is par- arly important with this parameter.

MAGE TO TREES

ees on and adjacent to campsites frequently have had their r branches broken, their boles hacked, and nails driven into them. In many cases, smaller trees have been cut down for firewood or tent poles. Standing snags have also been hacked and cut.

On sites which have trees either onsite or at their periphery, it is possible to rate this damage. The main problem is defining classes. Three classes can be defined as follows: (1) no more damage than some broken lower branches; (2) between one and seven tree mutilations (ax marks, scars, carvings, nails, cut stumps, and so on), no more than one of which is obtrusive; and (3) more than seven tree mutilations or more than one obtrusive mutilation. More than one mutilation can occur on a tree. Less stringent class definitions were necessary in the Bob Marshall Wilderness, where tree damage was severe. For comparative purposes at a later date, it is important to include brief notes on the size and location of the area to be reexamined and on the amount of different types of damage.

EXPOSURE OF TREE ROOTS

The number of trees with exposed roots has been found to increase along with amount of use as a result of soil compaction and erosion (Cole 1982). Root exposure is particularly pronounced on sites used by horse parties due to the practice of tying horses to trees.

This parameter, again, is only applicable to sites with trees onsite or at their periphery, and defining classes is difficult. I defined three classes as follows: (1) no trees with root exposure; (2) root exposure occurs, but on no more than three trees; and (3) root exposure on more than three trees (fig. 5). It is important to distinguish between natural root exposure in shallow soils and exposure of roots resulting from trampling. Training will lead to consistent judgments, and supplemental notes will facilitate future assessments of change.

EXTENT OF DEVELOPMENT

Developments include fire rings, log or stone seats and tables, windbreaks, leveled tent pads, and other human constructions. Both the number of developments and their obtrusiveness need to be considered. While not indicative of ecological change, the number of developments provide information as to how noticeable the "imprint of man" has been. In contrast to the preceding four parameters, the extent of development can be rapidly changed in either direction by managers or visitors.

I defined the following three classes: (1) nothing more than a scattered fire ring; (2) nothing more than one existing fire ring and crude log or stone seats; and (3) either more than one existing fire ring or well-developed seats, tables, windbreaks, leveled tent pads, or other developments (fig. 6). Make notes about the developments that led to your ranking of the site.

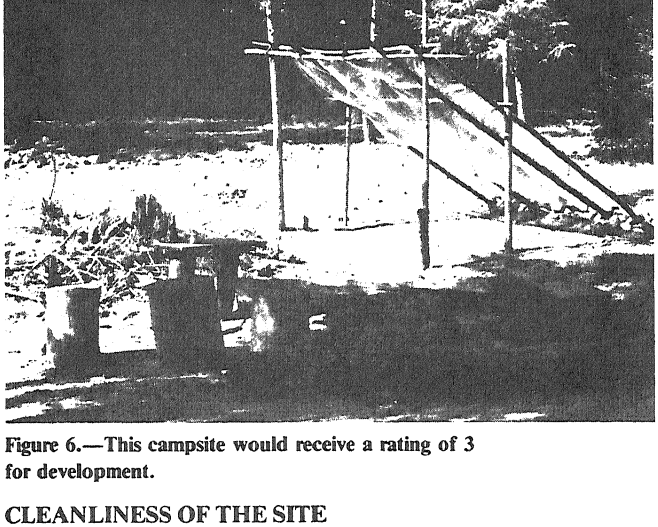


Figure 6.—This campsite would receive a rating of 3 for development.

CLEANLINESS OF THE SITE

This measure, like the preceding one, is not an ecological change and is subject to rapid change. In Yosemite National Park, however, Lee (1975) found that extent of development and cleanliness were the most critical variables affecting the visitor's enjoyment of the site. Included here is the amount of charcoal, blackened logs, other remnants of campfires, litter, toilet paper, human waste, and horse manure scattered around the site.

Three classes can be defined as follows: (1) nothing more than scattered charcoal from one fire site; (2) either scattered remnants of more than one fire site or some litter or blackened logs; and (3) any horse manure, human waste, or toilet paper, or widespread litter, blackened logs, or other remnants of campfires. Include notes with your ratings.

More difficulty arises in defining the edge of the s
can usually be recognized by a contrast between tra
untrampled vegetation. Trampled vegetation becon
useful criterion of the campsite as either the amoun
the susceptibility of the vegetation to trampling dan
creases. In areas with fragile vegetation, such as tall
shrubs, I have generally assumed that lack of appar
pling damage is a result of low levels of trampling; c
ly, I have assigned these sites to the smallest size clas
more resistant vegetation types, such as those domi
graminoids or small forbs, or on sparsely vegetated
pling stress may be great but not readily apparent. F
ple, many high elevation sedge meadows, such as th
inated by *Carex nigricans* (black alpine sedge) or *C.*
(shorthair sedge) are used often, but damage is not
and it is not possible to distinguish the edge of the si
cases, I have considered the areal measure inapplica

I defined three classes as: (1) 0 to 50 m^2 (0 to 538 ft^2)
100 m^2 (539 to 1,076 ft^2); and (3) greater than 100 m^2 (1

AREA OF THE BARREN CORE

As the central core of the campsite (usually the ar
the fire ring) absorbs an inordinate amount of use, t
tion in the vicinity is often eliminated. This creates a
barren core that grades into increasingly dense remn
etation with distance from the center. Schreiner and
(1979) have shown the value of an areal estimate of
core in their work in Olympic National Park. Consi
tion of the edge of the bare area comes with training
ibration of observers.

I defined three classes as: (1) 0 to 5 m^2 (0 to 54 ft^2)
50 m^2 (55 to 538 ft^2); and (3) greater than 50 m^2 (53

ACCESS TRAILS

Many campsites have a system of access trails tha
the campsite to water sources, main trails, or neighb
campsites. Both the number of trails and the degree
ment are of concern.

I defined three classes as follows: (1) no trails disc
(2) one or two discernible trails, but no more than o
developed trail; and (3) either more than two discer
or more than one well-developed trail.

Summary Ratings

It is possible, and usually desirable, to aggregate t
vidual ratings into a summary rating of campsite co
The easiest method is to weight each parameter equ
summary rating is then the mean value of all the par
applicable to the site. This implies that each of these t
change is of equal importance. It is more realistic, ho
evaluate the relative importance of each parameter us
weight the parameters accordingly. For example, mar

Vegetation Cover		Mineral Soil Cover	
5%	Offsite 50-75%	Onsite 5-25%	Offsite 0-5%

Notes	Rating	Weight	Product
surviving plants mostly Juncus and Carex; no exotics	3	1.0	3.0
most of site covered by thin, disturbed litter layer	2	2.0	4.0
5 felled trees; 6 trunk scars	3	1.0	3.0
5 trees with exposed roots	3	2.0	6.0
fire ring, 2 old fire sites, logs for sitting	3	0.5	1.5
ne manure, some trash, widespread charcoal	3	0.5	1.5
00 m^2	3	2.0	6.0
200 m^2	3	1.0	3.0
trails; 3 are well developed	3	1.0	3.0
	Total	11.0	31.0

Summary Rating 2.8

ted site easily visible from main trail. one of the first ge, obvious sites for hikers coming up the East Fork of iver. appears to be popular with horse as well as hiking Damage is heavy, but the site appears to be stable. hould be made to keep the area as clean as possible

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Name David Cole

t for data collection form.

otographs

few photographs of the entire site and selected features provide a useful supplement to field measurements. To be t useful, at least one photograph should include some fea- of the campsite or its vicinity which can aid in relocating ite. When photographing forested sites, make use of cloud r whenever possible, as patches of shade and sunlight make rpretation of the ground cover difficult. Moderately fast n ASA) color print film is useful for most purposes. Color is more sensitive to differences in ground cover than black white, and prints, although bulkier than slides, are easier fer to both in the field and in the office. Color film may to fade with age, however, suggesting that use of some k and white film may be desirable for long-term comparisons. he time of year and time of day should be noted on all tographs. If photographs taken in subsequent years are to mpared with any precision, it will also be necessary to rd the precise location of the photopoint, distance and ction to subject, height of the camera above the ground, era make and model, focal length of the lens, filter type, film type. These conditions should be replicated to as great xtent as possible when subsequent photographs are taken. rence as to whether the year has been unusually wet or or whether snowmelt was late or early may also be important.

ture Reassessments

eriodically—perhaps every 5 years—all of these sites should eexamined. Difficulties in relocating sites can be reduced if site is located on a map or with a pinprick on an aerial tograph, and if a reference photo of each site is taken into ield. It is also important to document on maps or aerial tographs all areas that were and were not thoroughly ched for campsites. When additional sites are found, this ndicate whether these sites are new or were just missed in earlier inventory.

USE OF CAMPSITE CONDITION DATA

Data on the condition of campsites provides information on the number of sites, their condition, and distribution. This forms a basis for evaluating the "acceptability" of current conditions and for developing management strategies and programs. It also serves as a baseline for a monitoring program.

To determine whether current campsite conditions are "acceptable" or not requires the definition of standards or "limits of acceptable change" (Frissell and Stankey 1972). These are statements of the maximum amount of change in conditions considered to be appropriate. For example, managers might state that no campsites will be larger than 1,000 ft^2 or no campsites will have a summary rating of more than 2.5. Then, by examining the inventory data, it will be possible to tell if current conditions meet these standards. If they do not, mitigating actions will be necessary.

The value of this approach is that it provides a coherent, logical basis for management that can be explained to visitors. It also provides a definition, in the form of standards, of the wilderness setting and experience the manager is trying to provide. This approach makes it clear when a management response is or is not needed and the success of that response can be judged by whether conditions become acceptable in the future or not.

At this time (1981), few areas have developed formal standards. Consequently, it is not possible to evaluate the acceptability of current conditions. The data can, however, be used to document current conditions and to identify both the extent or areal spread of campsite impacts and sites where impacts are particularly severe. This will help in the development of management priorities, whether attention is given to the preservation of portions of the area that have not been highly disturbed or to the rehabilitation of particularly severe problem areas.

This information will become increasingly valuable with time. If campsites can be relocated and reassessed in a manner consistent with the original assessment, it will be possible to identify trends in condition, of the whole area and of individual sites, and to relate these trends to changes in use characteristics and management actions. Having rated condition parameters separately, it will be possible to distinguish improvement in some parameters from deterioration in others. Such information should lead to an ever-increasing ability to meet management objectives established for backcountry campsites.

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Managers need information on the distribution and condition of wilderness campsites and how this pattern of impact is changing over time. This paper discusses desirable characteristics of a wilderness campsite impact monitoring system, evaluates existing methods, and provides suggestions for developing a system that builds on the strong points of existing techniques.

KEYWORDS: monitoring, campsite, backcountry management, wilderness, ecological impact

The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

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